



Hybrid QML Update

Issue 12

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QML Company Speaks in Support !

The following editorial, reprinted by permission, appeared in the December 2001 Issue of *Military & Aerospace Electronics Magazine*. The editorial was written by Aeroflex Circuit Technology, a QML-38534 hybrid microcircuit manufacturer, in reply to an article in the magazine concerning availability of military-grade electronics.

The wait is not long for all military-grade electronic parts

To the Editor:

This letter is in reference to the story entitled "Electronics suppliers told to stay with COTS, get ready to speed-up production" on page 1 of the November 2001 issue of *Military & Aerospace Electronics*.

I wish to take exception with two quotes from Clarence Peckham, president of SBS Technologies Inc. Government group in Raleigh, N. C. Specifically his quote in the 4th paragraph, Military-grade parts would take 10 to 20 weeks because they are built to order," and



"COTS helps because they can take components right off our production line, and expect to be at the head of the queue."

1st Exception

Aeroflex Circuit Technology offers dozens of "Military-grade parts" as "Commercial Off The Shelf (COTS) parts". The pedigree (MIL-grade or Space-grade) of a component (electronic or otherwise) has nothing to do with whether or not it is available as a "COTS" solution. QML/SMD assignment from DSCC, Columbus, Ohio, continues to provide a strong system, available nowhere else, which allows military system designers rapid insertion of the best commercial technology. It is important to understand that whether the system designer uses COTS components or "custom" components, the device has to support the requirements of the end user. These components often operate in harsh tactical environments; mission success is put at great risk and we all stand to lose. Mr. Peckham's insinuation that military-grade products are not available off-the-shelf is incorrect. It is important that *Military & Aerospace Electronics*, which is highly respected and well circulated in the aerospace industry, does not propagate misinformation about any COTS products.

Aeroflex Circuit Technology offers microelectronic devices such as Data Bus, Memory Modules, Microprocessor Modules and Radiation Tolerant Analog Multiplexer MCMs, all of which are available as mil-grade or space grade COTS. Coincidentally, SBS Technologies in Albuquerque, N.M., is one of our customers for the ACT4419-D MIL-STD-1553 Databus transceivers. Please see our short form brochure at: <http://www.aeroflex.com/act/pdf/utact-sf.pdf>.

Aeroflex's management continues to make significant inventory investments to make our products available off-the-shelf for the military aerospace electronics industry. Because they are in a catalog and on a price list, they can many times be shipped within days of order receipt. These qualify as COTS solutions; however, you will notice many of the devices are available by an SMD number. By virtue of having an SMD number assigned they are MIL-grade devices.

2nd Exception

"COTS helps because they can take components right off our production line, and expect to be at the head of the queue."

The COTS initiative was borne out of Defense Secretary William J. Perry's memorandum dated June 29, 1994 now known in our industry as the Perry Memorandum, which states that: "Performance specifications shall be used when purchasing new systems, upgrades to current systems ... If it is not practical to use a performance specification, a non-government standard shall be used. Since there will be cases when military specifications are needed to define an exact design solution because there is no acceptable non-government standard, or because the use of a performance specification or non-government standard is not cost effective, the use of military specifications is authorized as a last resort, with an appropriate waiver".

Mr. Peckham can ship parts in as little as two days because he has them sitting on a shelf, not because they are not Mil-grade. Aeroflex Circuit Technology's SMD parts are right off our production line. They do not have to go to an independent test house for "upscreening" or the like.

I disagree with Mr. Peckham's quotes as indicated above. I am also disappointed that *Military & Aerospace Electronics* published what I believe is incorrect information that, in this critical time, may affect the correct product purchase. I would hate to see a customer purchase a COTS product instead of a needed Mil-grade COTS product because a *Military & Aerospace Electronics* article indicates he has to wait 10 to 20 weeks! When he doesn't! There are many instances where Mil-grade COTS products are required and there are suppliers, such as Aeroflex Circuit Technology, who are able to supply these products quickly.

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Sourcing and Qualification Unit Web pages

http://www.dscccols.com/offices/sourcing_and_qualification/

The Sourcing and Qualification web pages were originally developed mid 1995 to provide a user-friendly approach to downloading the Unit's Query Tool programs. The web pages have since been expanded to disseminate much of the public information that was formerly distributed on paper. Our Unit continues to support those customers who rely on paper documents, but we are developing cost effective real-time alternatives to the traditional paper documents, and providing them on the World Wide Web.

General features of the VQ web pages:

- Most pages and graphics are very small for fast transfer to the user's computer.
- Pages have been written to utilize the latest features of the Hypertext Markup Language (HTML) language and the Active Server Pages technology. Pages are best viewed on the latest versions of the popular web browsers, but should display acceptably on any older browser.

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This Hybrid QML Update is an unofficial publication produced by DSCC-VQH to keep users and manufacturers informed on issues concerning Hybrid and MCM microcircuits. The articles contained herein are for information only and do not represent official Defense Logistics Agency (DLA) policy. We invite comments and feedback concerning the topics presented in this issue and suggested topics and articles for future issues. Contact us at DSCC-VQH, PO Box 3990, Columbus, OH 43216-5000, or <http://www.dscccols.com/offices/VQ>, or 614-692-0663.

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Items currently available on the VQ web pages:

- General information from the Unit office including the mission, and organizational statement.
- General information for each of the Unit’s four Teams (**Custom Devices, Hybrid Devices, Passive Devices, and Electronic Devices**). Information includes program information, contacts, QML/QPL status, downloadable forms, and various reports.
- **Qualified Manufacturers List (QML)** and **Qualified Products List (QPL)** documents available in the Adobe Portable Document Format, including historical revisions, and downloadable databases (on selected QMLs/QPLs). Also, pending qualification actions are listed where applicable.
- An **on-line part search** capability. Downloading is not required. Currently, 115 different QPLs and QMLs are searchable via this new capability.
- Information about the Unit’s **ISO 9000 value-added audit program** including background information, audit information, and the DSCC-VQ ISO 9000 Registration list.
- Reports and information including progress reports, program initiatives, newsletters, and program updates.
- Information about the Unit’s **Commercial Laboratory Suitability Program** (Includes List of Commercial Laboratories Suitable for Testing Military Devices).
- A web page where customers can add contact information so that they may be notified of significant web site changes, or notified of QML/QPL updates

Future initiatives for the VQ web pages:

- The addition of many more QPLs available through the on-line

Internal Water Vapor Content- It's Not Just for Water Anymore!

by: Jim Eschmeyer, DSCC-VQH

MIL-PRF-38534 and other military specifications typically allow a maximum of 5000 ppm (0.5%) water when tested to test method 1018 of MIL-STD-883, Internal Water-Vapor Content. As a result, when discussing Residual Gas Analysis * (RGA) data, often the first (and sometimes only) gas mentioned is water. Because of the reliability issues associated with water in a package, there is good reason why emphasis is placed on how much water is inside the package. On the other hand, often not enough emphasis is placed on the remaining 99.5% (give or take depending on amount of water) of the gases. Most hybrids are sealed in nitrogen or a nitrogen/helium mixture that comprises the bulk of the atmosphere. For practical reasons, there are no limits for other gases commonly found in hybrids, e.g., oxygen, argon, carbon dioxide, hydrogen, fluorocarbons, etc. But that certainly does not mean that we should ignore these gases. Rather, these gases can reveal information about the sealing process, package materials, and package integrity.

The following are some examples of RGA data sent to DSCC to validate a process or to qualify a package. As you’ll see, although the parts passed the 5000 ppm water requirement, the other gases indicate problems resulting from assembly processes or materials.

All values are in ppm unless shown otherwise.
To save space, not all gases within the RGA report are shown.
ND = None Detected

Example 1.

Part	1	2	3	Part 2 has hermeticity problems. Note the presence of helium and fluorocarbons in this part but their absence in the other parts. These gases were able to get in during the leak test bombing. Similarly, this part has increased oxygen and argon that probably came from the earth’s atmosphere. Hydrogen, being a small molecule, likely leaked out of the package.
Water	1133	4060	253	
N ₂	99.7%	94.3%	99.8%	
He	26	20,000	ND	
O ₂	301	26,000	345	
Ar	17	928	18	
Fluorocarbons	ND	4668	ND	
H ₂	42	ND	46	

Example 2.

Part	1	2	3	This is a little subtler than example 1 yet has some similarities. In this case, helium was intentionally added during the sealing process. Helium is also a small molecule and in this example leaked out of Part 3 as opposed to being forced into Part 2 in Example 1. As in the above example, note the elevated levels of oxygen, argon, and fluorocarbons and the reduced amount of hydrogen.
Water	235	249	4919	
N ₂	80.6%	81.3%	85.9%	
He	19.1%	18.3%	12.1%	
O ₂	103	39	9059	
Ar	29	15	825	
Fluorocarbons	ND	14	314	
H ₂	993	906	75	

Example 3.

Part	1	2	3	This data was sent to DSCC to validate a facility move. Looking at the water alone indicates no problems. However, oxygen levels are quite high and previous RGA results on file from this company showed very little oxygen. In this case, the company looked into potential sources of the oxygen, took actions, and resubmitted other RGA data prior to DSCC’s approval of the move.
Water	461	636	353	
N ₂	84.2%	85.2%	85.4%	
He	13.8%	13.5%	13.4%	
O ₂	16044	8183	7756	
Ar	1112	802	806	
Fluorocarbons	9	7	6	
H ₂	1745	3325	2605	

Example 4.

Part	1	2	3	Like the other examples, the water is below 5000 ppm. However, the ammonia (NH ₃) averages close to 25,000 ppm or 2.5%. The excessive ammonia was outgassed from a non-5011 adhesive with which these hybrids were assembled. High levels of ammonia can be harmful to the hybrid, especially on uncovered metallization.
Water	1183	1389	1473	
N ₂	96.33%	95.99%	96.18%	
He	18	21	23	
O ₂	0	0	2	
Ar	233	241	232	
Fluorocarbons	5	6	4	
H ₂	899	716	867	
NH ₃	23,881	26,181	24,543	

Internal Water-Vapor Content is a complex test method and data can be very difficult to interpret sometimes. We hope that this helps in understanding that water, although important, is just one piece of data in the RGA report. The laboratories are required to report anything above 100 ppm and some laboratories will report gases below 100 ppm. Even though MIL-PRF-38534 and other military specifications do not have limits for gases other than water, we hope that the above examples stress the importance of looking at all of the data in the RGA report. In addition, for those readers who are involved in the purchasing of hybrids, DSCC’s review of test reports and associated RGA data is yet another advantage in buying QML parts. A buyer can specify requirements that his vendor’s non-QML hybrid pass the 5000 ppm of water, but without an independent and knowledgeable person reviewing the data, it is very difficult to be certain that other potential problems were looked for and corrected.

*Test method 1018 is commonly referred to as RGA.

New Kids on the Block

Greg Cecil has recently joined the DSCC-VA team. Greg will work on the Hybrid General Specification, MIL-PRF-38534, and will be team leader for all Hybrid Standard Microcircuit Drawings (SMDs). Greg received his engineering degree from Franklin University in Columbus in 1997 and received his EIT Certification in June of 2000.



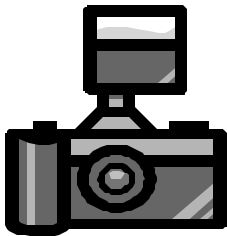
Joe Rodenbeck has joined the DSCC-VA team. Joe will be taking custody and managing the care of MIL-PRF-38534, General Specification for Hybrid Microcircuits, and MIL-STD-883, Standard Test Methods for Microcircuit. Joe received his Bachelors degree in Electrical Engineering from Rose-Hulman Institute of Technology in 1971 and his Masters degree from Butler University in 1976. Joe has 31 years of experience in both private and public industry. He has worked at Aircraft and Electronics Specialties, the Reliability Analysis Center, and Raytheon Systems Company. In addition he has 15 years with the DoD working for The Naval Air Warfare Center, The Program Management Office for Strategic Systems Programs, and now with the Defense Supply Center, Columbus.

Photos Anyone?

With the advent of digital cameras, getting good photos of defects and being able to insert them into documents has become much easier. We are currently in the process of compiling defect photos to supplement those in MIL-STD-883 and MIL-STD-750. If you have any photos of defects in hybrids or hybrid components (ICs, capacitors, substrates, resistors, transformers, etc.) that you are willing to share with your fellow manufacturers and users, please forward them to Joseph.Buben@dscc.dla.mil. If you have old fashioned printed photos to share, you may forward them to:

DSCC-VQH
Attention: Joe Buben
3990 East Broad Street
Columbus, OH 43213-1199

Please edit any items you consider proprietary.



Company Profiles



FMI & HyComp Merge Under Name SatCon Electronics

Film Microelectronics, Inc., located in North Andover, Massachusetts, purchased HyComp, Inc., located in Marlborough, Massachusetts in 1999. Three years latter, in 2001, SatCon Technology Corporation, the parent company to FMI decided to merge both companies into one facility. This was a logical decision because both FMI and HyComp produce MIL-PRF-38534 Hybrid Microcircuits, ThinFilm substrates and chip resistors. This would allow resources to be shared, increase efficiency and reduce costs; and because FMI was at capacity and HyComp had expanding capabilities, we moved to Marlborough. Now that we have settled into our facility and obtained ISO-9001:2000 Certification, we are one company and our new name will be “SatCon Electronics”. As SatCon Electronics we will continue to support and grow our MIL-PRF-38534 product line, Thin Film line, as well as our new Surface Mount and FR Product line.

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ISO 9001 Reminder

By: Jonnie Schneider, DSCC-VQH

All ISO 9001, 9002 and 9003 registrations to the 1994 ISO standards will become obsolete effective January 1, 2004. Will you be registered to ISO 9001 2000 by then?

Step 1: Your first step is to perform a gap-analysis. This is the buzzword for the process of reviewing your current system against the ISO 9000 2000 requirements. A matrix is an organized way to approach this. The left side of the matrix below lists the ISO 9001 paragraphs. The next column grouping includes the internal



method of meeting the requirements. The final column will identify any activity that is required by ISO 9001 2000, but not working in your system presently. Below is a partial example of what the matrix might look like.

Step 2: The next step is to present those differences to Top Management. This is now a critical decision point. ISO 9001 2000 puts a great deal of emphasis on top management’s involvement. Make sure he or she understands this and puts the resources behind the changes needed. Good Luck!

Step 3: The next step is to break down the gaps into reasonable action items and hopefully disseminate between a number of action officers. These action officers should meet at a predetermined frequency to report to Top Management how the actions are coming along and to bring up any problems where they need help or just input to resolve. Be sure to call your registrar with any questions during this phase to make sure what you are planning will meet the ISO requirement.

Step 4: Implementation and training is your next step. Each action officer should make sure his or her items are complete, well understood by the effected employees, and the paperwork is signed off and in place. Records should begin to be generated to support the implementation.

Step 5: Now you can test the implementation by performing a self-audit of the implemented system. Perform any corrective actions as needed.

Step 6: Coordinate an audit with your registrar. If DSCC-VQ is your registrar, you will need to send it materials for a desk review. This will include your self-audit results, your revised QM plan, a record of management review, and any newly written or significantly changed documents.

Warning: If DSCC is your registrar, you need to be ready for ISO 9000 2000 no later than your last regularly scheduled military reaudit prior to January 1, 2004. DSCC does not intend to make special trips to approve ISO changeovers from the 1994 to the 2000 editions.

Have You Talked With Your Customer About QML-38534 Lately?

ISO 9000 2000 Gap Analysis for XYZ Corporation					
ISO 9001 2000	Subject	ISO 9001 1994	Internal	Gap	Impact (Cost and Time)
4.2.2	Quality Manual	4.2.1	QM	Need to rewrite in the order of ISO 9001 2000. Need a new matrix. Must identify that Service and Design are not applicable. Need a flow to show the overall process and interactions.	Short term: Time consuming to rewrite and retrain. Long term: none
5.1	Management Commitment	NA	QM Sections 1 and 2 Management Policy 39.7	Need to document the quarterly all hands meetings as to content and attendance. Need to improve the management review process to include more input items, measurements of quality objectives, and outcome. Need to document how management shows evidence of making sure that resources are available.	Short term: Time consuming to document originally. Long term: Management reviews will become more important. More record keeping for the all-hands meetings. More items to self-audit annually.
7.5.4	Customer Property	4.7	QM Section 4.7 Receiving Inspection Procedure 40.29	Minor language changes needed	Short term: minor Long term: none
8.3	Control of nonconforming product	4.13	QM Section 4.13 Quality Procedure 41.7	none	Short term: none Long term: none
7.5.3	Identification and traceability	4.8, 4.12	QM Sections 4.8 and 4.12 Production Procedure 44.12	none	Short term: none Long term: none



By: Jonnie Schneider, DSCC-VQH

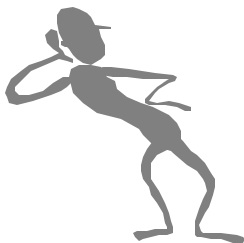


Which of the items below belong in your hybrid source or specification controlled drawings (SCDs) and which ones do not?

1. QCI tables	2. Electrical test forcing functions and test limits
3. Burn-in Circuit	4. Package Dimensions
5. Lead finish, length and pin-out	6. Class H, K, G, D, or E with notes
7. Operating conditions	8. Screening Tables
9. Table number and paragraph references to the Screening table in appendix C of MIL-PRF-38534.	10. Radiation Testing
11. Radiation Performance you are assuming based on previous data and technology	12. Copy of all applicable wording and tables from MIL-PRF-38534
13. Revisions to Military and Industry Specifications and Standards such as MIL-STD-883, MIL-PRF-38534, JEDEC-STD-9	14. "MIL-PRF-38534 Certification is required, but QML Qualification is not required."

Answers: Items 2, 3, 4, 5, 6, 7, 10, and 11 belong in the SCD. All part specific information should be documented in the SCD, even assumptions, because many things can effect radiation hardness. If the supplier does not know that radiation tolerance is an issue for you, they will not know to notify you of changes that could affect the radiation performance. Items 1, 8, 9, 12, and 13 do not belong in the SCD. It is never a good idea to repeat anything if you can help it. Adding words to the SCD makes it bulkier, harder to read, increases the potential for error, and creates conflicts for the supplier between their system which is current to the latest revision, and your SCD calling for old revisions. The more you stick to the manufacturer's standard flow, the less expense is involved in conversion of customer requirements and lead time. Item 14: Can we talk!? - (614)692-0585

Call For Newsletter Articles



We welcome input from the industry that could be included in future editions of the Hybrid QML Update. If your organization has any activities that are of interest to the hybrid/MCM community, we encourage you to submit material on each subject and we extend our thanks to those who have contributed. Please send your articles to your DSCC-VQH contact or Jackie Cunningham at 614-692-0584 or Brad Deslich at 614-692-0593.



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HYBRID QML UPDATE - CHECK IT OUT!

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